

External Thermal Insulation Composite Systems (ETICS)

Reaction to Fire

27 June 2013

Frankfurt, Germany

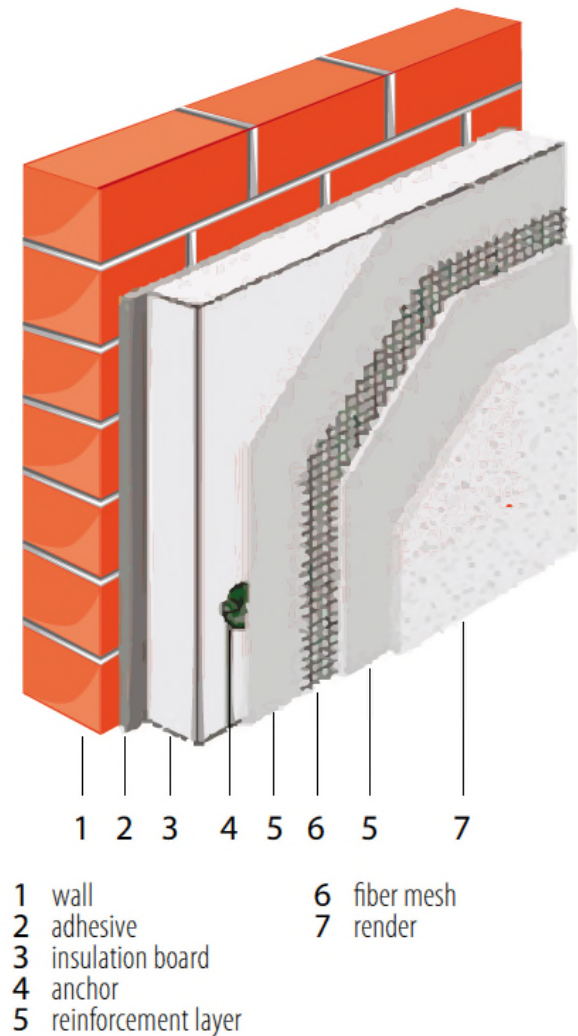


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The European Association for ETICS - EAE

What is an ETICS?

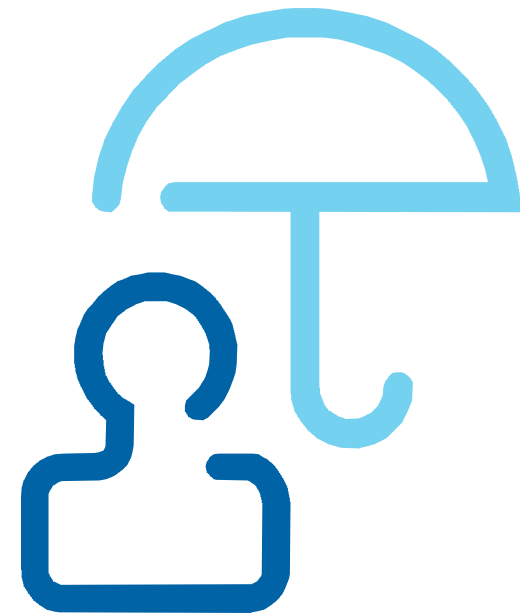
- External Thermal Insulation Composite System
- Delivered as a kit (set of components from one manufacturer)
- Used for new build and refurbishment
- ETAG 004: European Technical Approval Guideline



The **European Association for External Thermal Insulation Composite Systems (ETICS)** is the umbrella association of

- 11 national ETICS associations;
- 4 European associations of leading suppliers (insulation materials); and
- 1 supporting company member.

EAE represents about 85 % of Europe's ETICS market.





THE EUROPEAN ASSOCIATION FOR ETICS - EAE



Ordinary members



- *Qualitätsgruppe Wärmedämmsysteme, Austria*



- *Branchevereniging Producenten gepleisterd Bouwen, Netherlands*



- *IVP, Werkgroep ETICS, Belgium*



- *Stowarzyszenie na Rzecz Systemów Ociepleń, Poland*



- *Cech pro zateplování budov, Czech Republic*



- *Združenie pre zatepľovanie budov, Slovakia*



- *Groupement du Mur Manteau, France*



- *Verband Wärmedämmverbundsysteme, Switzerland*



- *Fachverband Wärmedämm-Verbundsysteme e.V., Germany*



- *Insulated Render and Cladding Association, United Kingdom*



- *Consorzio per la cultura del sistema a capotto, Italy*



THE EUROPEAN ASSOCIATION FOR ETICS - EAE



Extraordinary members



- *European Manufacturers of Expanded Polystyrene*



- *European Phenolic Foam Association*



- *European Insulation Manufacturers Association*



- *The European voice of the polyurethane insulation industry*



- *EJOT Building Fasteners*

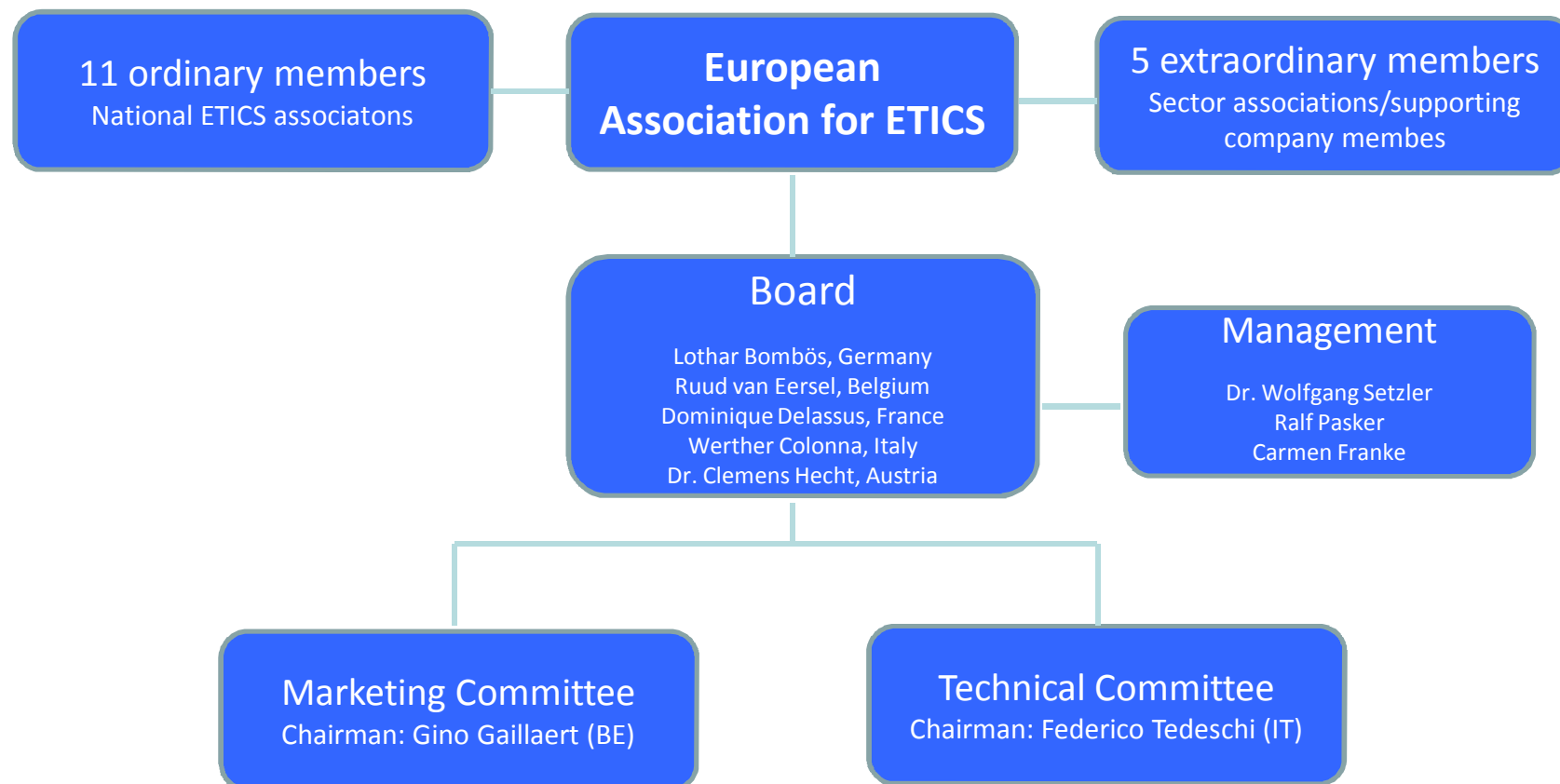
EAE Board



Truly European

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Ruud van Eersel, IVP (Belgium), Caparol
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Dr. Clemens Hecht, QG Wärmedämm-
systeme (Austria)

Organogram



Major objectives

- Cross-border exchange of experiences and common efforts to further develop the use of ETICS in new built and thermal renovation of building stock:

One strong voice for ETICS in Europe!



Quality of ETICS

**Quality of
planning**

**Quality of
components**

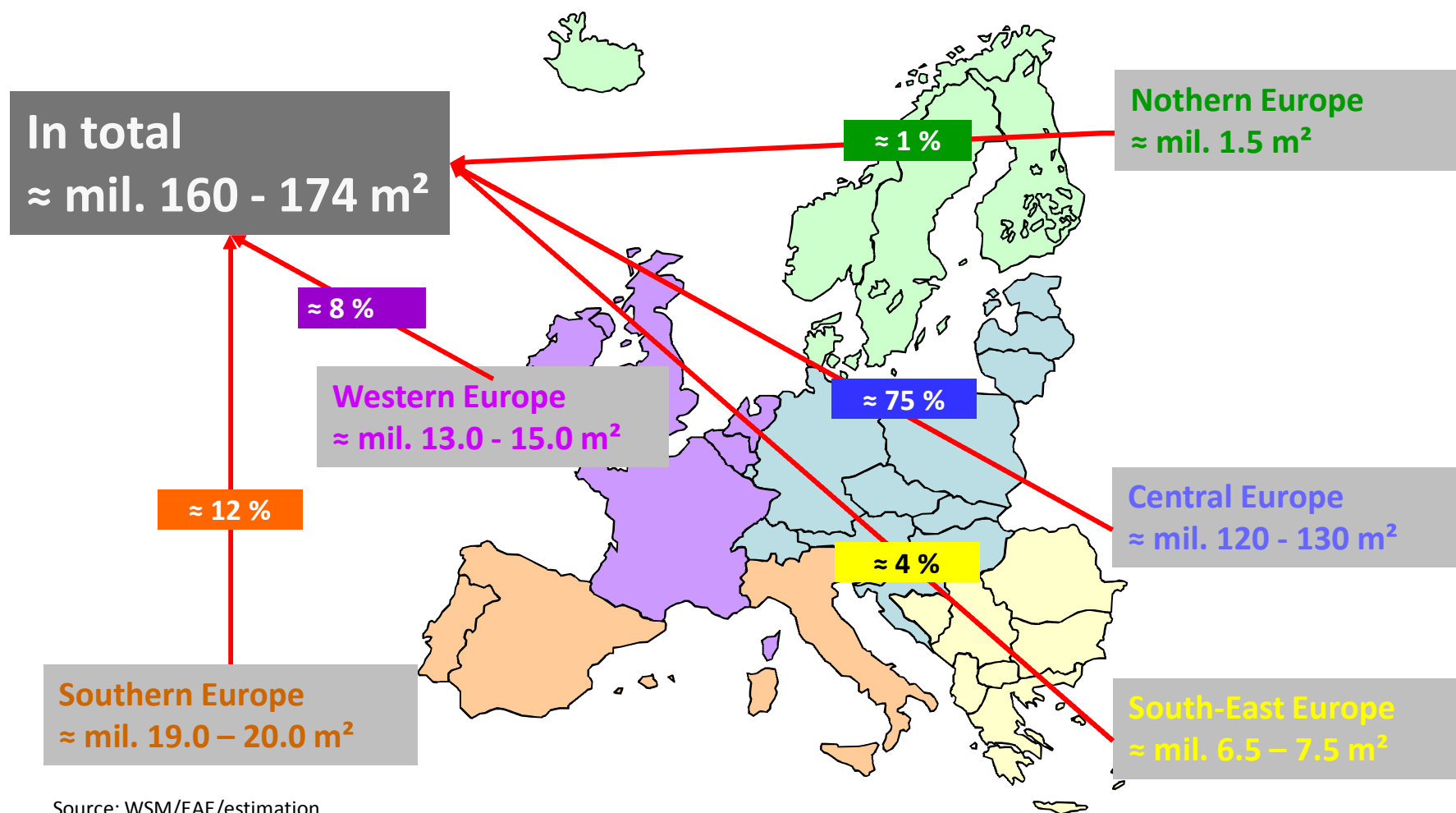
**Quality of
execution**

**Quality of
the system**



2

European ETICS Market: Facts & Figures



Source: WSM/EAE/estimation

In total

EPS $\approx 82 - 83\%$ MW $\approx 11 - 12\%$ Others* $\approx 5 - 7\%$

*PF, PU, CG, XPS, WF, WW, ...

Western Europe

EPS $\approx 82\%$ MW $\approx 11\%$

Southern Europe

EPS $\approx 88\%$ MW $\approx 9\%$

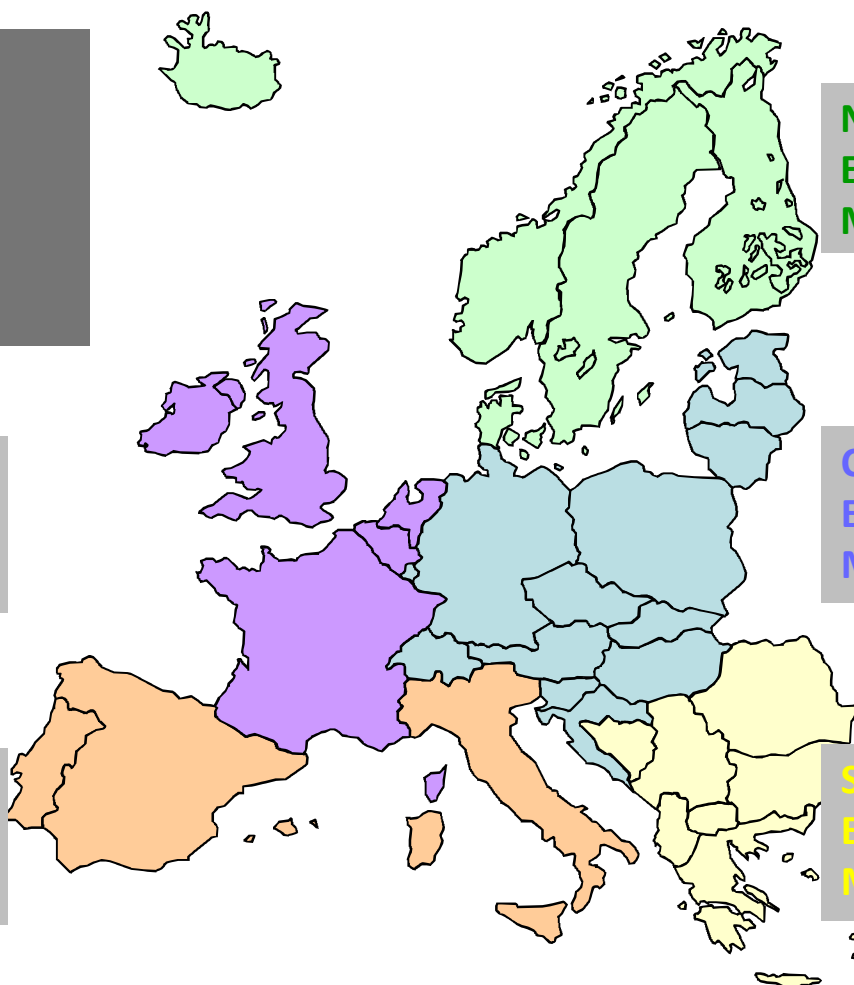
Northern Europe

EPS $\approx 70\%$ MW $\approx 23\%$

Central Europe

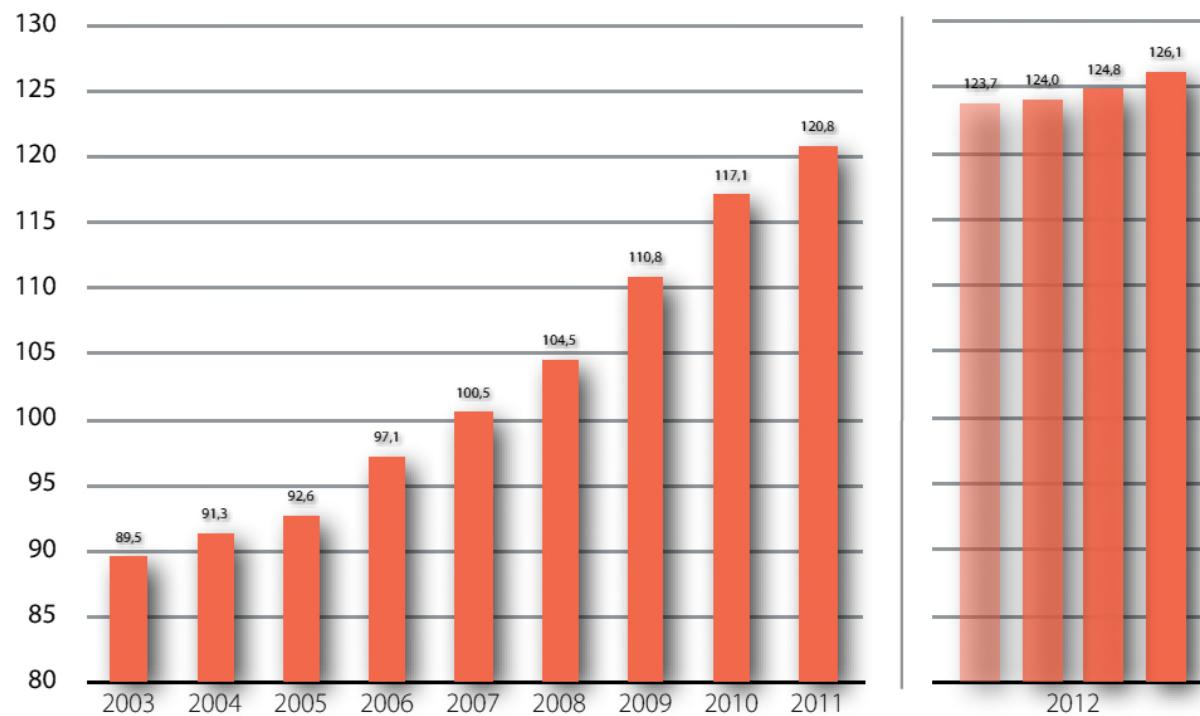
EPS $\approx 84\%$ MW $\approx 12\%$

South-East Europe

EPS $\approx 60\%$ MW $\approx 25\%$ 

Source: WSM/EAE/estimation

- Average thickness in Germany: 126 mm (2012)
- Young markets catch up rapidly

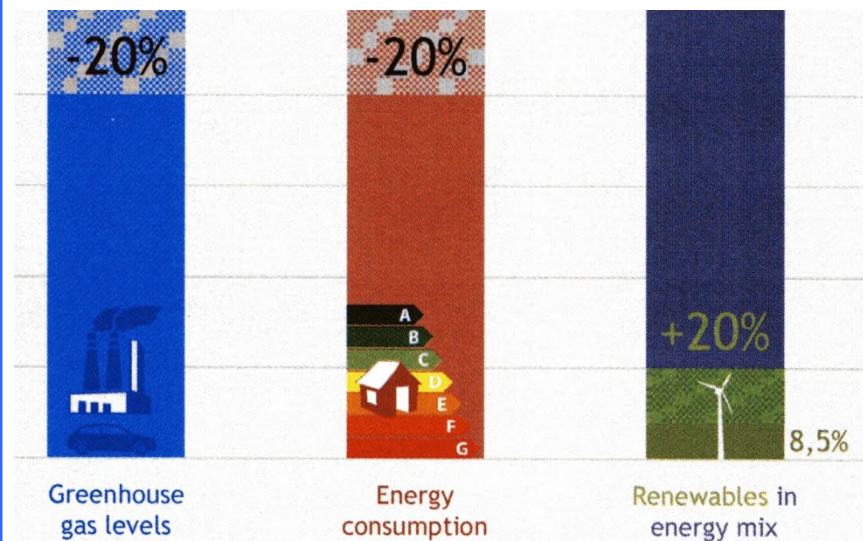


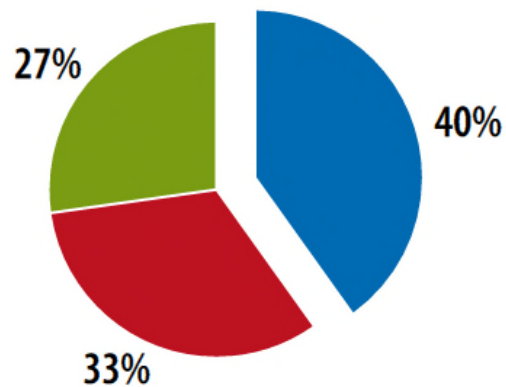
Source: Fachverband WDVS (Germany)

European political objectives for 2020:

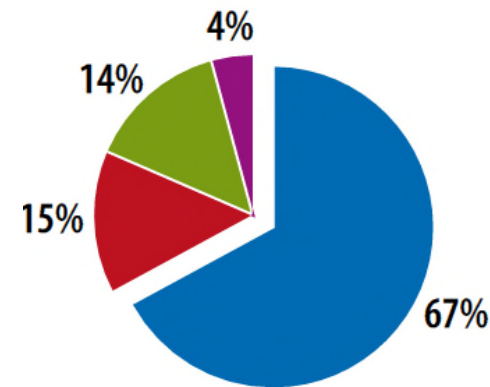
- Reduction of GHG emission by 20%;
 - Reduction of energy consumption by 20%;
 - Increase the share of renewable energy generation to 20%.
- National roadmaps to improve energy efficiency

The EU's 20-20-20 policy to be implemented by 2020





■ buildings (households and services)
■ traffic
■ industry



■ heating
■ lighting and electric devices
■ warm water
■ cooking

- **Greatest leverage:** Reduction of **energy consumption of building stock**
- **Potential:** savings of 700 bil. TWh – especially reduction of heating energy



3

ETICS and Reaction to Fire



3.0

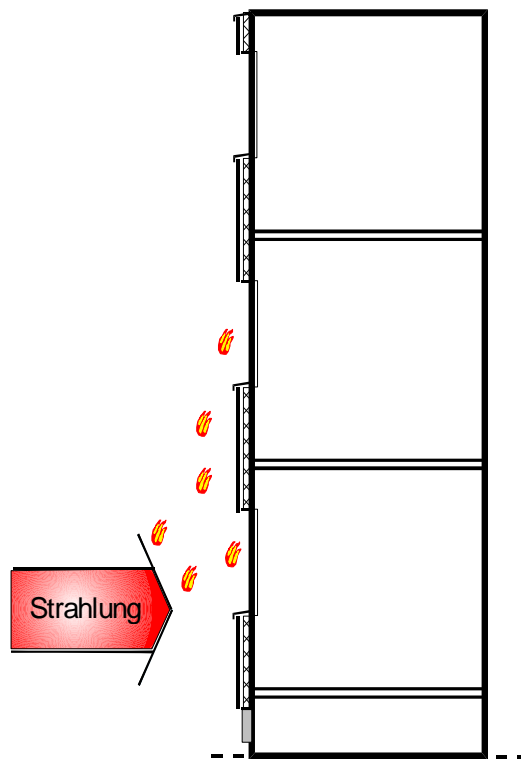
General remarks

Reaction to Fire – historical development

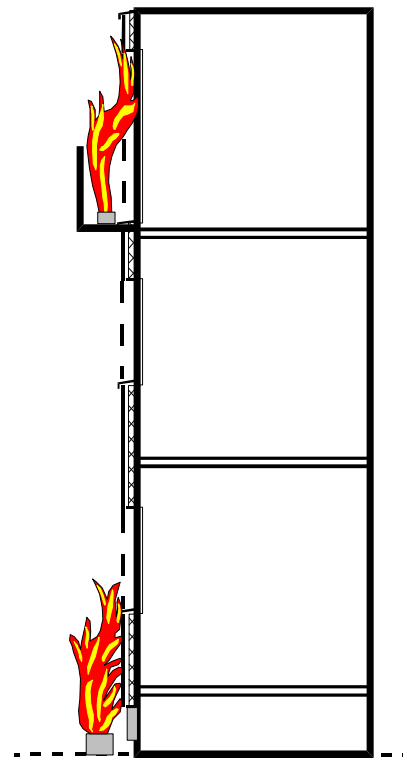
- Increasing insulation thickness
 - Before 2005 insulation thicknesses > 100 mm rare
 - New energy legislation + increasing energy costs: increasing average thicknesses
- ETICS industry (2006)
 - Series of tests to further improve fire safety
 - Large-scale tests and natural tests (real estates)
- Result
 - Introduction of fire barriers to ETICS with combustible insulation



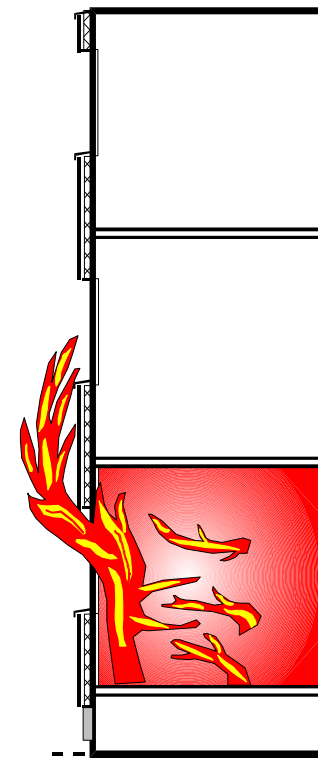
Fire scenarios for facades



**Fire in the
neighbourhood**



**Fire attack from
outside (in front of
the facade)**



**Fire attack from the
interior (rooms)**

Typical situation: fire starts in a single room (pictures: no insulation at all)



After 12 minutes
„flash-over“ 1st floor



After 20 minutes
„flash-over“ 2nd floor



After 25 minutes



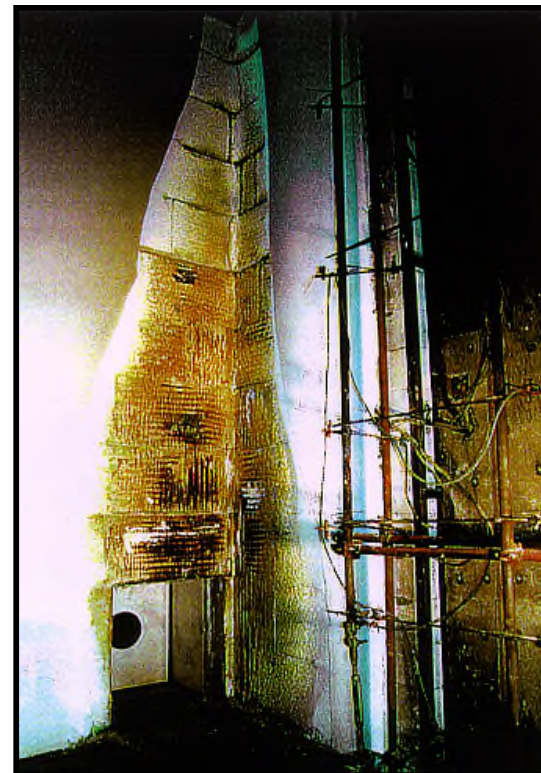
3.1

Reaction to Fire without fire barriers

Reaction to fire without additional fire barriers

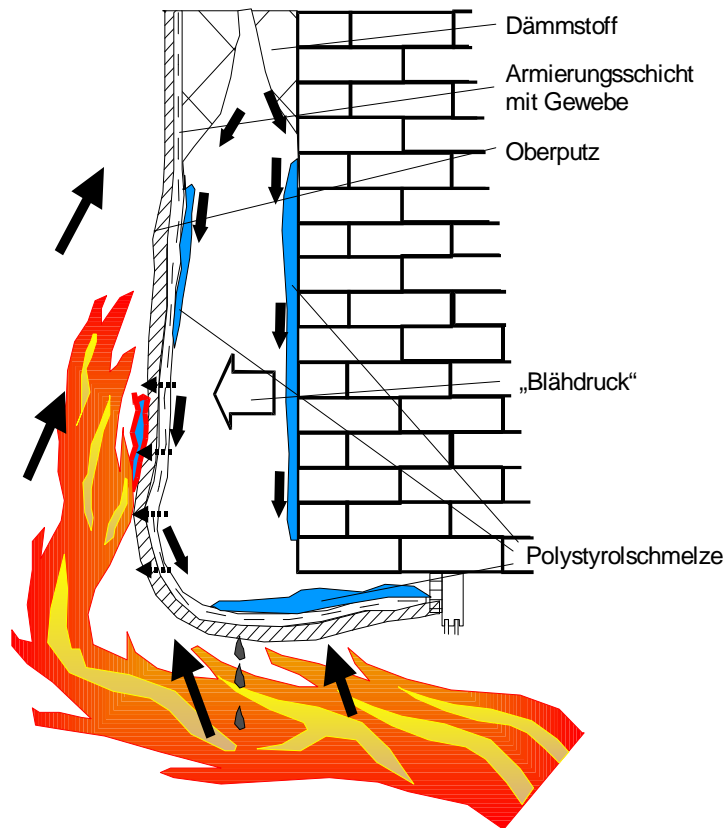


100 mm EPS 15
Rendering after testing



100 mm EPS 15
Insulation after rendering
was stripped
→ RTF acceptable

Reaction to fire without additional fire barriers



- Increasing pressure inside the ETICS (heated air, pyrolysis gas)
- Pyrolysis gas escapes through the rendering
- Organic content of rendering burns
- Lintel deformation



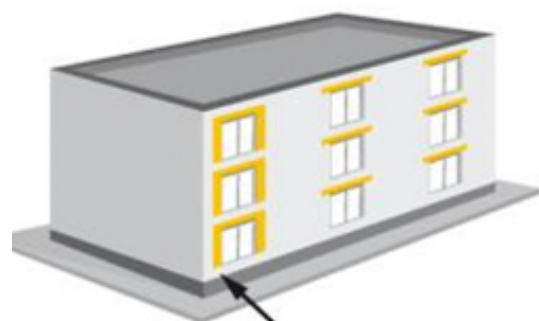
3.2

Solutions – two options

Fire barriers in EPS-ETICS: two options

Strips of mineral wool above each single lintel

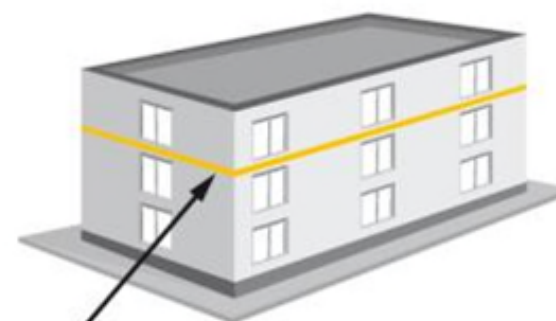
Prevention of fire-attack to insulation layer



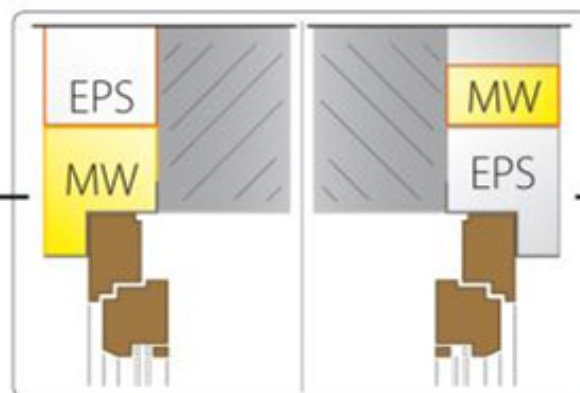
Additional measures required in case of window shades and windows installed in front of solid wall structure

Uninterrupted strips at floor level

To stop fire-attack at every second floor level



No additional measures required in case of window shades and windows installed in front of solid wall structure





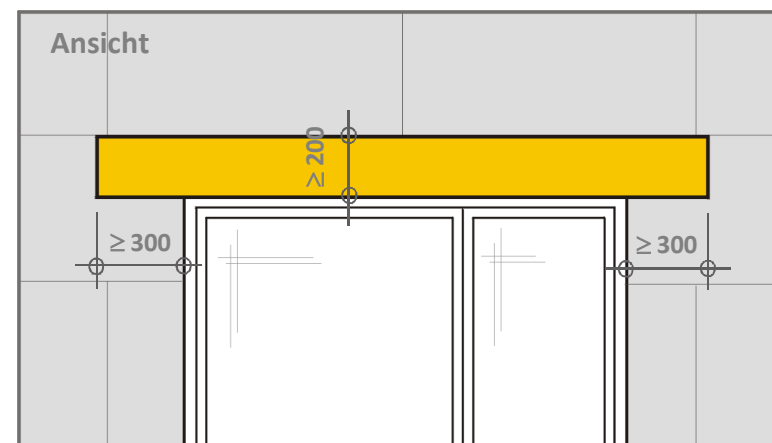
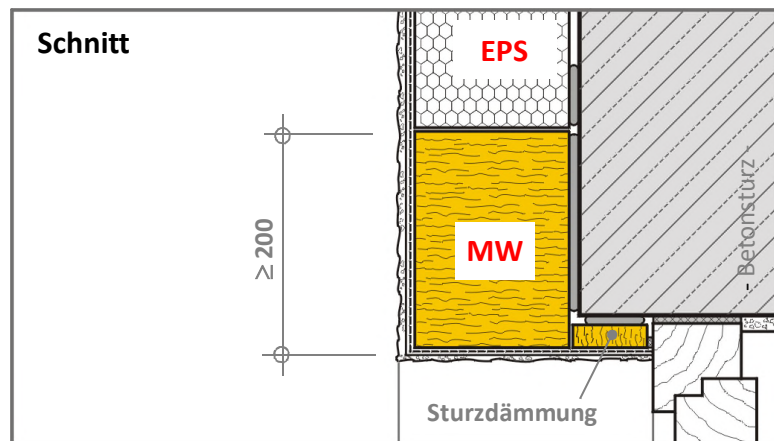
3.3

Option 1: fire barriers above openings

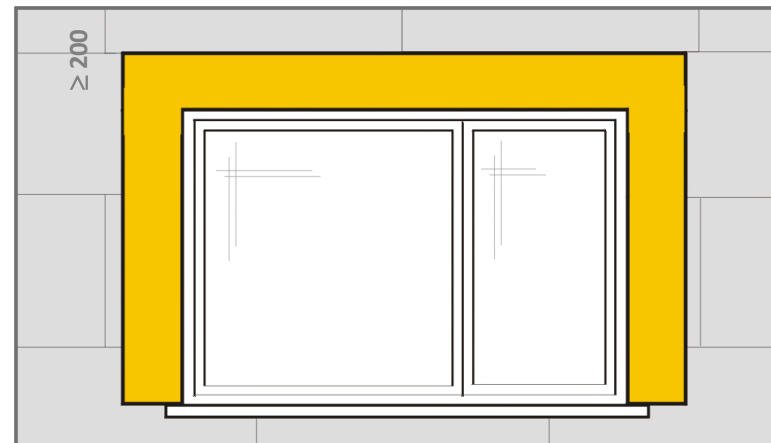
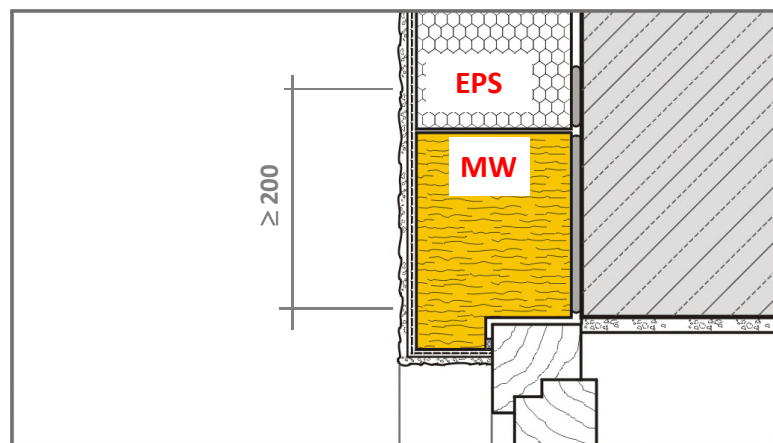
3.3

OPTION 1: FIRE BARRIERS ABOVE OPENINGS

Standard application without window shades and without window frames within insulation layer



Special application in case of window shades and without window frames within insulation layer



Reaction to fire with additional fire barriers (lintel)



200 mm EPS 15
Rendering after testing



200 mm EPS 15
Insulation after removal of
rendering

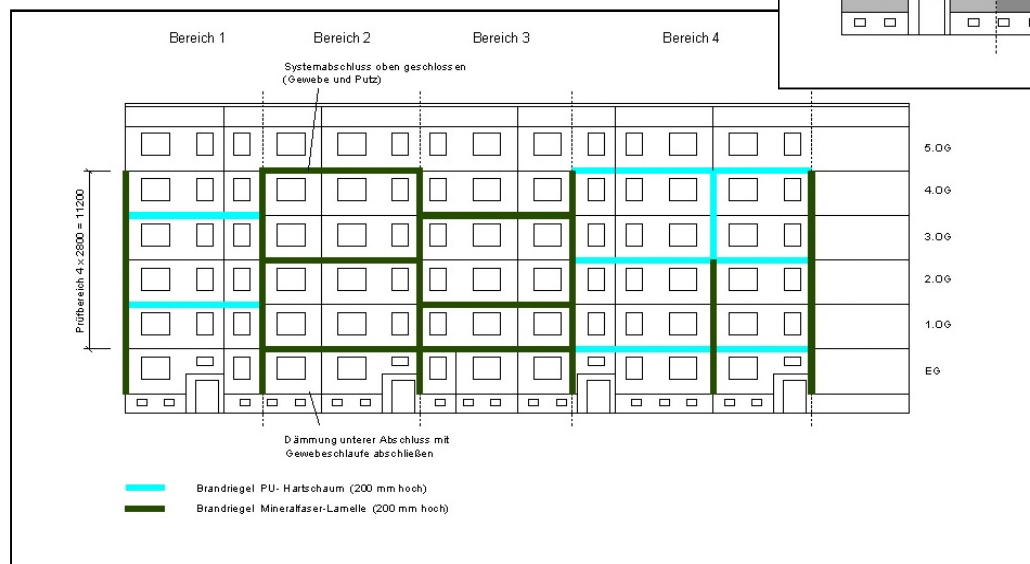


3.4

Option 2: surrounding fire barriers

Fire tests Bad Salzungen/Germany

- December 2006
 - Real building
- ⇒ **Supervised by German approval body DIBt and fire brigades**

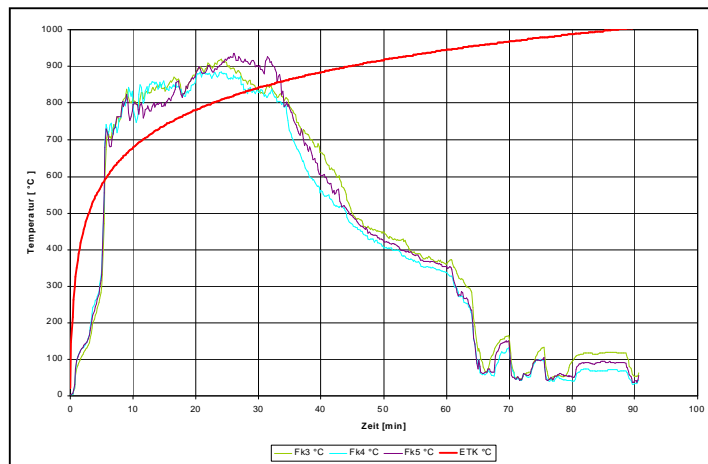


Fire tests Bad Salzungen/Germany

- Test szenario
 - Fire in one room next to the facade with flames through the window opening after flash-over
- Facade cladding
 - Bonded ETICS with flame retardand EPS (Germany: PS20, class B1) and organic rendering
- Fire barrrier
 - Horizontal strips made from mineral wool or PUR/PIR with 20 mm EPS facing)



Thermal load caused by test fire



Room:

- Floor area: 9-12 m²; height: 2.5 m
- Windows: 0.9 m (1.7 m x 1.4 m)

Fire load:

- 375 kg (resp. 475 kg) wood plus 40 – 50 l Isopropanol
- Equals 723 – 772 MJ/m²

Ventilation:

- Window completely open plus simulation of circulation by fan

Fire attacks:

- Room: 35 minutes of total fire
- Facade:
 - flash-over after 5 minutes (flames out of window opening)
 - Max. height of flames: 4 m
 - Duration of direct flame attacks: 35 minutes

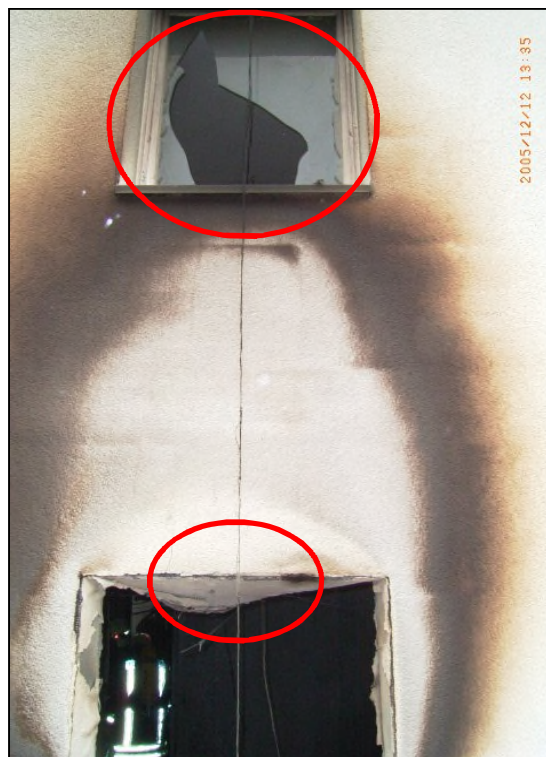
3.4

OPTION 2: SURROUNDING FIRE BARRIERS

ETICS with 200 mm EPS insulation + surrounding fire barrier right above the window (0.5 m)



During total fire:
flames reach lintel of the
window above
(next floor level)



After the test:
Rendering at lintel area
opened; fire reached next
floor level via window



After removal of rendering:
Fire barrier made from PU
(with 20 mm EPS facing) still
in place

ETICS with 200 mm EPS insulation and MW fire barrier 3.5 m above the window



During total fire:
flames reach lintel of the
window above
(next floor level)



After the test:
Rendering at lintel area
opened; fire reached next
floor level via window



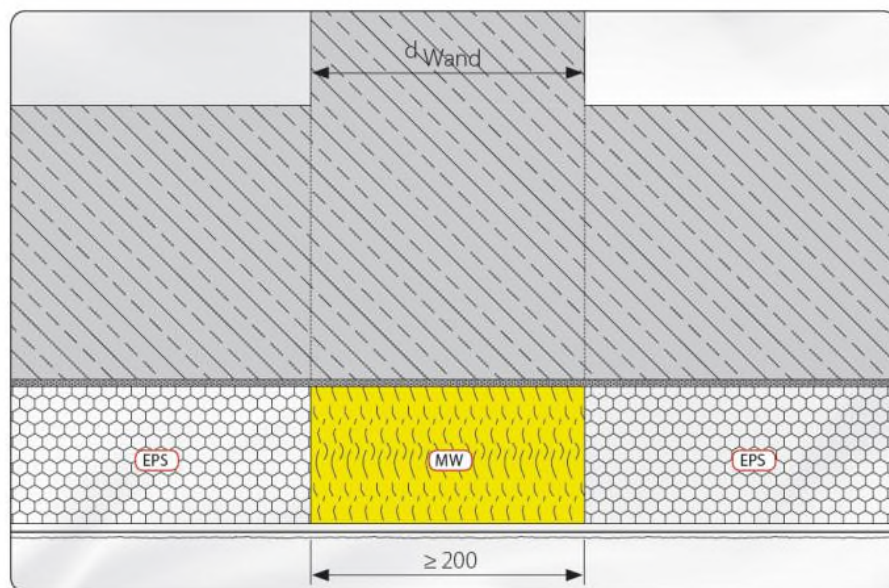
After removal of rendering:
Fire barrier made from MW still
in place

Details for design and execution of ETICS

Combination of
fire-barriers



Details for design and execution of ETICS



Fire walls: to be covered with non-combustible insulation material

Fire walls: to be covered with non-combustible insulation material





3.5

Fire from outside

Fire attack from outside: plinth situation



Waste container



Car parking

Situation with fire at plinth areas:

- Immediate flame attacks on the ETICS
- Flames will reach windows at facades with and without insulation

Fire incident in Hamburg/Germany 27/04/2012



Fire caused by 2 motor bikes in front of the facade

- Ground floor and first floor immediately affected
- Due to tremendous heat windows burst up to the forth floor
- Smoke in apartments
- ETICS with non-combustible insulation

Fire test of fire brigade in Graz/Austria in September 2007



Ignition of two waste containers right in front of the facade



Only local damages

Bonded ETICS with 100 mm EPS insulation and organic render system; without plinth (= open from below) → No serious damages despite application mistake



4

Conclusion



Test results show:

- Organic content of render systems burns in a very limited area of the facade and does not support vertical or horizontal extension of the original fire
- Original flame is not enlarged significantly
- No or limited risk of droplets

„Approved ETICS properly installed and maintained are safe in use“ (German parliamentary commission involved in investigation of fire safety of EPS-ETICS)

- Further tests regarding reaction to fire of plinths
- Evaluation of improvements on construction sites
- ETICS industry takes fire safety seriously
- Adaption of latest results
- Open for exchange of experience

Thank you for your attention!

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